

**THE CONCEPTUAL NATURE OF MARINE RESEARCH TOURISM AND KEY
STAKEHOLDER INVOLVMENT IN MARINE RESEARCH TOURISM**

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ABSTRACT

Marine research tourism is a form of marine ecotourism whereby marine research is an important part of the tourism attraction. Research was undertaken to further understand marine research tourism and how can that knowledge be used to further involve key stakeholders in marine research tourism across Australia? Focus was placed on exploring correlations and any notable relationships between key stakeholder preferences and conceptually derived tourism criteria. Ventures were classified as either classified as vacation or volunteer minded. Marine research quality across both vacation and volunteer minded ventures ranged from moderate to high. The potential involvement of key stakeholders in marine research tourism was shown to be dependent on variations in the levels of marine research quality, stakeholder views, volunteer mindedness, tourist training, tourist skills, hospitality and adventure.

INTRODUCTION

As tourism advances and evolves an industry, many new specialised forms of niche tourism emerge. Among these is marine research tourism, a type of tourism that is marine-based and involves some level of research. Specifically, we define marine research tourism as a form of marine ecotourism whereby marine research is an important part of the tourism attraction and there is an opportunity for paying tourists and/or paying volunteers to be actively involved in marine research activity (Adapted from Benson, 2005). Other definitional (Benson, 2005) features of a marine research tourism venture include:

1. There are researchers who are engaged in official marine research pursuits
2. There is an official research centre that supports research activity
3. There is research supervision for any tourist marine research activity

For this research, a marine research tourism venture, the venture must last for one or more days, be advertised publicly, take paying tourists or volunteers, and operate on a commercial basis (Adapted from Ellis, 2003a). Marine research tourism products are defined to include marine research programs, ventures, destinations, attractions, activities and interpretation for marine research tourists.

Cousins (2007) and Ellis (2003b) report that a majority of regional or globally focused marine research tourism operators worldwide are organised from companies based in the UK or USA. A preliminary assessment of marine research tourism across Australia indicates that there is a notable paucity of regional and globally based operators in Australia. Instead Australian marine research tourism is mostly characterised by a range of small and independent privately owned ventures. As such, the marine research tourism industry in Australia can be considered as relatively under developed. This can be considered surprising as, in world terms; Australia has an advanced marine research sector, a relatively mature marine tourism industry, a large coastline and ocean region, and a wealth of marine wildlife and other natural assets. When compared to the UK and the USA, the marine research tourism industry in Australia can be considered as relatively under developed. This can be considered surprising as, in world terms; Australia has an advanced marine research sector, a relatively mature marine tourism industry, a large coastline and ocean region, and a wealth of marine wildlife and other natural assets. As a result, the following questions arise, if marine research tourism has many potential benefits, the marine research tourism industry is rapidly growing elsewhere in the world in world terms, and Australia has many favourable conditions for marine research tourism, why is research tourism less developed in Australia and how can marine research tourism be expanded across Australia? Whilst the first question posed is an important one in the global context, the aim of this paper is to answer the second question: how can marine research tourism be expanded across Australia?

To help answer the second question, it is arguable necessary to understand the following four points;

- 1. What would be considered desirable for any marine research tourism expansion?***
- 2. What is the tourism related conceptual nature of marine research tourism?***
- 3. What is the nature of marine research tourism ventures worldwide, and***
- 4. What are implications of this knowledge for the involvement of key stakeholders in marine research tourism?***

The first two questions above are answered through a review of existing literature. In order to answer question three, the concepts and models from the literature review are applied to a sample of 46 marine research tourism ventures to develop a greater understanding of existing marine research tourism ventures as well as to test the concepts presented in the literature review. Next these results are applied to a discussion of how marine research tourism could be expanded across Australia.

LITERATURE REVIEW:

This part of the paper will focus on the current state of knowledge regarding marine research tourism and its relationship to other better known forms of alternative and niche tourism sectors. Included in this review are some of the benefits of including the general public in science, and in particular using volunteers in a leisure and tourism context. Next existing frameworks borrowed from volunteer tourism, ecotourism and scientific tourism are reviewed to better our understanding of marine research tourism. These can then be applied to existing marine research tourism ventures in the results section to examine its suitability to the Australian context.

1. What would be considered desirable for any marine research tourism expansion?

There is a long tradition of using non-specialist volunteers in conservation projects, particularly in Britain and the USA (Darwall & Dulvy, 1996). Volunteers represent a large and generally cost-effective workforce that can be used to collect data in conservation projects that are labour intensive but technically straight-forward (Forster-Smith & Evans, 2003). Other advantages are

that the volunteers themselves gain fulfilment and knowledge, as well as an opportunity to broaden their horizons; a research methodology is developed that is straight-forward enough for non-specialist volunteers and which is likely to be continued in the long-term using local expertise and financing; there is an increase in the level of public awareness of ecological issues through active participation of the general public; there is an opportunity for scientists to interact directly with the public and increased the perceived relevance of science to the local community; volunteers may possess their own qualities, knowledge and skills that may benefit scientific research; volunteers may provide new insights into their research by suggesting alternative hypotheses, as well as providing scientists with an opportunity to become more interdisciplinary in their approach.

On the other hand, some research into volunteer tourism suggests that participants need to feel that there are substantial benefits to be gained from their volunteering experience (Henderson, 1981). A corollary of this is that staff should become more aware of the needs of the volunteer tourists that can be fulfilled through volunteerism. Thus, it is important for researchers to remember that whilst they seek to maximise their teams' performance, the fact that volunteer tourists are volunteering, and have their own goals (such as enjoyment) place important constraints on management.

A pragmatic basis for understanding what would be desirable for any expansion of marine research tourism across Australia is to ensure that desired benefits and concerns of key stakeholders are understood and satisfied (Coghlan, 2007, Cuthill, 2000, Musso and Inglis, 1998). Key stakeholders of marine research tourism in Australia include Australian marine researchers, marine managers, marine conservation groups, marine education groups, marine tour operators, and tourists (Coghlan, 2007, Cuthill, 2000, Musso and Inglis, 1998).

Notably, Coghlan (2007) reports that a majority of marine researchers, when on a marine research tourism venture, prefer to focus the marine research priorities of the venture than the hospitality, tour guide and tourist training aspects of the marine research tourism venture. This is understandable as marine researchers and marine research agencies are naturally focused on high quality marine research outcomes. Furthermore, it is reasonable to suggest that they are naturally inclined and likely sponsored to only undertake marine research and not participate in marine research tourism. Their potential involvement in marine research tourism may be further troubled as marine tour operators may be too busy, not inclined or not suitably trained to effectively support the interests of marine researchers (Musso and Inglis, 1998). Table 1 summarises these and some other notable desired benefits or concerns of key marine research tourism stakeholders regarding marine research tourism.

Table 1: Some notable desired benefits or concerns of key marine research tourism stakeholders regarding marine research tourism ventures

Key stakeholder	Desired benefits	Concerns
Marine researchers	High quality marine research outcomes	Involvement in hospitality, tour guide and/or tourist training
Marine managers	High quality marine research and management outcomes	Involvement in hospitality, tour guide and/or tourist training
Marine ecotour operators	A commercially viable marine ecotourism venture	Possibly too busy and not suitably trained to support the interests of marine researchers
Marine conservation and education groups	High quality marine research and conservation outcomes, increased skills, education and awareness of marine tourists towards marine research	
Marine research tourist	The opportunity to learn, experience new and different things, have fun and contribute to a worthwhile project (Coghlan, 2006)	

Ellis (2003b) highlighted a research need to understand how to involve research and management agencies in research tourism. Based upon the points made in Table, several scenarios of potential key stakeholder preferences can be proposed.

First, it is suggested that high quality marine research and management outcomes may increase the willingness of many marine researchers and management agency's to be involved in marine research tourism. Furthermore, minimising the involvement of marine researchers and marine research agencies in providing hospitality, tour guide and/or tourist training may also increase the involvement of many marine researchers. In contrast to this, for marine research tourism ventures, marine conservation and education groups may prefer increased education, training and awareness of marine tourists towards marine research and related conservation issues.

Furthermore, the tourist's desire to learn and experience new and different things may be at odds with the marine researcher's preference to be less involved with tourists. This social environment provides a useful framework of understanding different key stakeholder preferences for different types of marine research tourism ventures. As the next step in this analysis, Table 2 then summarises some suitable criteria for measuring some of these key stakeholder preferences.

Table 2: Suitable criteria for measuring key stakeholder preferences on marine research tourism ventures

Criteria name	Description
Level of marine research quality	What is the relative level of research significance to the marine research tourism venture? This is related to the relative benefits of any marine research to the marine research community
Level of training of tourists	What relative level of skill training does the tourist receive on the venture?
Level of hospitality	What is the relative hospitality level based on a standard 1 to 5 accommodation star rating scheme?
Level of tourist's pre-requisite skills and education	What relative level of pre-requisite skills and education does the tourist require to participate on the venture?

2. What is the tourism related conceptual nature of marine research tourism?

As well as the adopted definition for marine research tourism, three tourism conceptual frameworks may be applied to understand marine research tourism include the volunteer and vacation minded tourism concept (Brown & Morrison, 2003), Coghlan (2007)'s conceptual framework for volunteer marine research tourism, and Benson (2005)'s proposed conceptual framework for research tourism.

(i) Volunteer and vacation minded tourism

Brown and Morrison (2003) report that volunteer tourism can take two different forms based on participants' mindsets: the 'volunteer-minded' versus the 'vacation-minded'. Volunteer-minded individuals tend to devote most or all of their vacation time to volunteer activities at the destination and this type of volunteer tourism is often called a mission or service trip (Brown & Lehto, 2005). Vacation-minded individuals spends a small portion of the vacation on volunteer work at the destination and appear to attach high values to the opportunities for educating children and bonding with family members. They also seek camaraderie on the vacation and appear to attach high values to the opportunities for educating children and bonding with family members (Brown and Lehto, 2005). Vacation minded travelers also seem to be driven by sense of adventure and desires for exploration and novelty that are not as prominent with the more serious volunteer minded travelers (Brown and Lehto, 2005). While there has been increasing research on volunteerism which sheds insights on motivational and destination choice factors of

the ‘volunteer minded’ service trip participants, Brown and Lehto (2005) state that very little research has been conducted on the ‘vacation-minded’ volunteer tourists.

One exception to this is Coghlan (2006) who states that “potential volunteer tourists do make a distinction between trips that may be more closely related to ecotourism holidays, and trips that offer a true volunteering experience, with its emphasis on altruism, learning, and networking or meeting like-minded people”. In general, experienced volunteer tourists, or biology and environmental science students were looking for other types of benefits out of these holidays, in particular increasing their skills or knowledge (Coghlan, 2006). Conversely, volunteer tourists who were less familiar with volunteer tourism were more likely to be attracted by the ‘fun’ or holiday content of the trip (Coghlan, 2006).

(ii) Coghlan (2007)’s conceptual framework for volunteer research tourism

Coghlan (2007) empirically developed a conceptual framework for volunteer research tourism ventures via a detailed content analysis of venture (n=27) mission statements and related promotional material (Figure 1). Coghlan determined that volunteer research tourism ventures can be categorised as; research conservation, holiday conservation, adventure holiday and community holiday ventures. A particularly significant outcome of Coghlan’s conceptual framework is the empirically derived recognition of a holiday element to volunteer research tourism ventures.

ORGANISATION TYPE	Research Conservation Expeditions	Holiday Conservation Expeditions	Adventure Holiday Expeditions	Community Holiday Expeditions
Characteristics	↓	↓	↓	↓
Mission Statement	Conservation		Adventure/ Personal Dev.	Cross-cultural understanding
Photographs	Animals & data	Animals & Adventure	Volunteers, Volunteers with locals Adventure	Locals, Volunteers & Work Monuments
Sorting criteria	Conservation		Community	
	Research Focus on 1 species or environment 1 destination	Holiday Several projects &/or destinations Range of expedition themes	Community Holiday Range of projects &/or Destinations Range of expedition themes	
Examples	MICS, Tethys, ECCIB	Earthwatch CCC	Raleigh, Brathay	i-to-i Teaching Abroad

Figure 1: A proposed conceptual framework for understanding marine research tourism, based on Coghlan (2006)

(iii) Benson (2005)'s proposed conceptual framework for marine research tourism

Benson's (2005) conceptual framework represents research tourism as a combination of better known tourism types namely; alternative, ecotourism, volunteer, scientific and educational tourism (Figure 2). Marine research tourism is clearly research tourism within a marine tourism context. It is proposed that adventure and wildlife tourism be included within this conceptual framework as after a preliminary review of marine research tourism ventures, these tourism types are present within those ventures.

Inherent within Benson's conceptual framework is that combinations of traits from those better known tourism types can be manifested within research tourism ventures. Such traits can cover tourism concepts, models and criteria related to tourist and host typologies, motivations, markets, behaviour and satisfaction, destinations, attractions and activities. The end result is potentially powerful conceptual framework for understanding marine research tourism. However, this conceptual framework has only been empirically validated by Benson (2005)'s in-depth case study of Operation Wallacea in Indonesia. For Benson's conceptual framework to be reliably applicable to the broader community of marine research tourism, it is proposed to be tested over a representative sample of marine research tourism ventures world wide.

In order to test Benson's conceptual framework suitable criteria that describe traits of all those better known tourism types should be identified as surrogates for measuring the presence or absence of those better known tourism types within a marine research tourism venture. Furthermore, characteristics of all those tourism criteria can be used to measure and further understand the tourism conceptual nature of marine research tourism ventures. Such tourism criteria are summarised in Table 3.

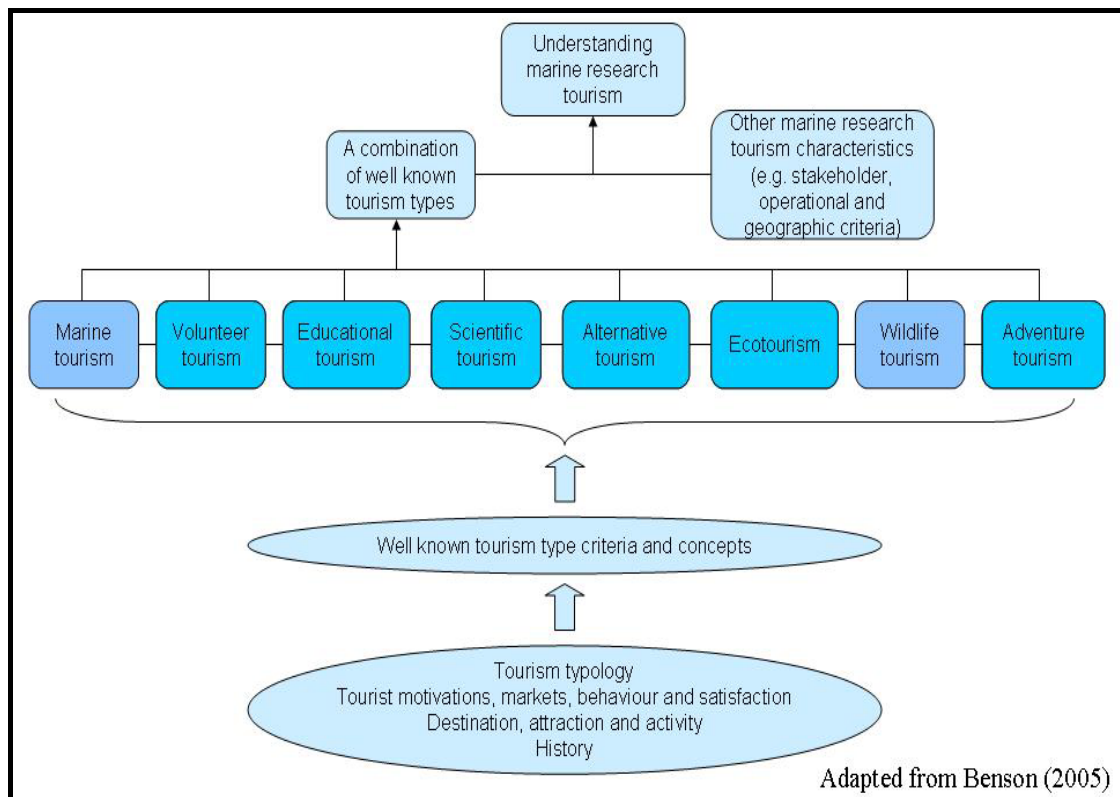


Figure 2: A proposed conceptual framework for understanding marine research tourism, adapted from Benson (2005)

Table 3: Better known tourism criteria can be used to measure and further understand marine research tourism

Better known tourism type	Criteria name	Description
Volunteer tourism	Level of volunteer mindedness	What is the relative level of the tourist's volunteer mindedness (Brown and Lehto, 2005; Brown & Morrison, 2003)?
Alternative tourism	Level of alternative tourism	What is the relative level of alternative tourism? An alternative tourism experience is defined by how unlike the tourism experience is to a mass tourism experience? (Robinson, 2005)
Ecotourism	Level of ecotourism depth	What is the level of depth along the ecotourism spectrum (Acott et al., 1998)?
Educational tourism	Level of educational tourism	What is the relative level of marine research education for the tourist while on the venture?
Scientific tourism	Level of scientific tourism	What is the likelihood that there are there scientific tourists on the venture? A scientific tourist is a scientist who pays to undertake scientific research on a tour (Benson, 2005).
Marine tourism	Presence of marine tourism characteristics	Is the venture a marine tourism venture? That is, does the venture take place in marine and/or coastal environment (Orams, 1999)
Adventure tourism	Level of adventure challenge	What is the relative level of adventure challenge (Swarbrooke et al., 2003)?
Wildlife tourism	Presence of wildlife as a marine research attraction	Does the venture involve wildlife as part of the marine research attraction?

The above conceptual frameworks and related criteria provide an opportunity to explore the nature of marine research tourism ventures worldwide. Such an exploration would be aimed at testing Benson (2005)'s proposed marine research tourism conceptual framework, classifying marine research tourism ventures and potentially illustrate any significant relationships between various marine research tourism criteria.

3. The nature of marine research tourism ventures worldwide

DATA ASSESSMENT AND ANALYSIS

As a basis for exploring the nature of marine research tourism worldwide, a representative sample (n=45) marine research tourism ventures worldwide, a data assessment and analysis of a representative sample (n = 45) of marine research tourism venture web sites was undertaken. Potential marine research tourism venture web sites were identified with the assistance of Internet search engines, various marine research and tourism web pages, and stakeholder and researcher knowledge. Venture web sites were selected according to the adopted definition for marine research tourism. For each venture web site, the data assessment involved;

1. Recording the presence or absence of better known tourism types across different marine research tourism ventures and Likert ranking (relatively low - 1 to high - 5) of better known tourism type criteria
2. A hierarchical cluster analysis based on the better known tourism type criteria
3. A discriminant analysis (based on rankings from relatively low - 1 to high - 5) of suitable key stakeholder preference criteria, and a comparison of these with venture characteristics

The method of secondary data assessment of venture web sites was chosen as it provided a cost efficient way to obtain information on various tourism criteria about many marine research tourism ventures that operate across the world. Limitations of such a web site assessment included the collection of sometimes limited and commercially biased information and hence necessary subjective assessment and Likert ranking of criteria characteristics by the researcher. A concerted effort by the researchers was made to overcome such limitations and ensure a reliable dataset for analysis. The estimated error for each Likert ranking is nominally estimated at ± 0.25 .

Recording the presence or absence of better known tourism type criteria across different marine research tourism ventures and Likert scale ranking of the these criteria

A frequency analysis was undertaken on the Likert ranked data of better known tourism type criteria so as to identify the distribution and any potential relationships between better known tourism type criteria (Figure 3). Notably, Figure 3 shows that the proposed marine research tourism conceptual framework is mostly valid across marine research tourism ventures worldwide. The main exceptions being the ventures ($n = 11$) with low or low to moderate levels of volunteer mindedness and the ventures ($n=13$) with low to moderate levels of alternative tourism.

Ventures that exhibit lower levels of volunteer-mindedness and alternative tourism might be considered to exhibit high levels of vacation mindedness. As a consequence, the proposed marine research tourism conceptual framework should be expanded to include tourism concepts and criteria that relate to both vacation focused and less alternative marine research tourism ventures. This finding is supported by Coghlan's (in press) recognition of the holiday element within volunteer research tourism ventures.

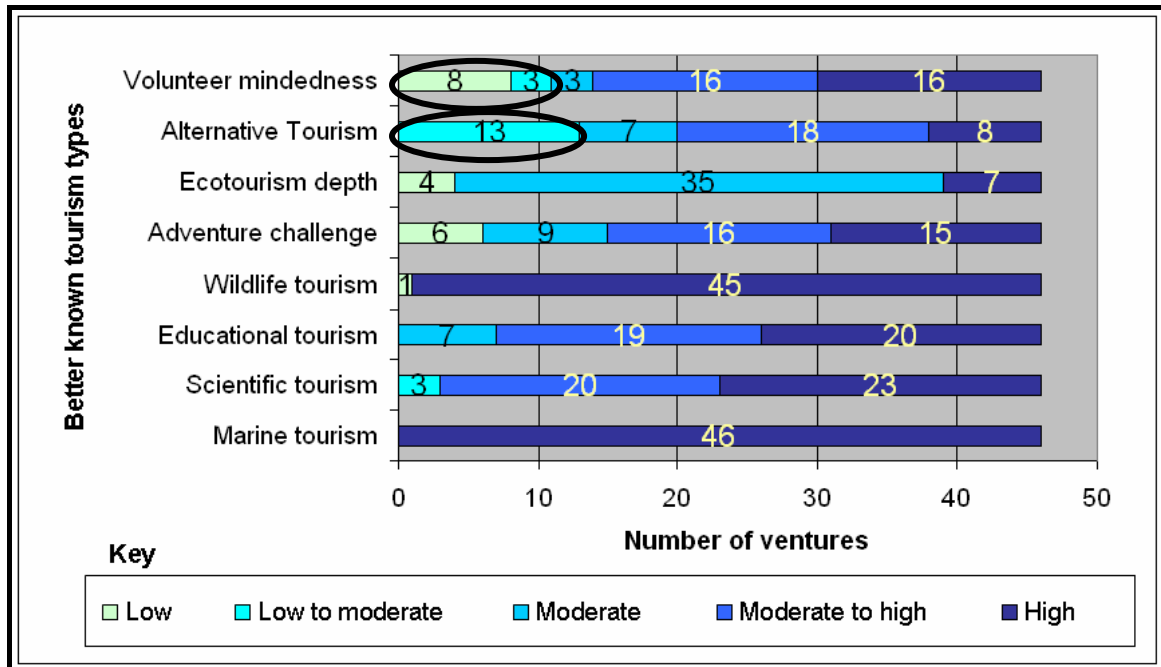


Figure 3: Distribution of better known marine research tourism types across a representative sample of marine research tourism ventures worldwide

Furthermore, Figure 3 also shows that there are four ventures with low levels of ecotourism depth, six ventures with low levels of adventure challenge, three ventures with low to moderate levels of scientific tourism, and all ventures have moderate or higher levels of educational tourism. All ventures were considered marine tourism ventures as they all took place in marine and/or coastal environment. Just one venture had low levels of wildlife present, and this indicates that the majority of marine research tourism ventures worldwide are focused on marine wildlife research.

A correlation analysis was undertaken on the relevant Likert ranked data to explore if there are any potential relationships between better known tourism types. Notable results include a high Pearson correlation ($r = 0.8$) between level of volunteer mindedness and alternative tourism, and a moderate correlation ($r = 0.52$) between level of ecotourism depth and adventure challenge. There is also a low correlation between level of volunteer mindedness, and ecotourism depth ($r = 0.16$) and adventure challenge ($r = -0.14$). These results suggest that variations in the level of volunteer mindedness and alternative tourism are a key factor that can be used to understand variations in the character of marine research tourism. Furthermore, levels of ecotourism depth and adventure challenge have similar but lesser and relatively independent role in understanding the conceptual nature of marine research tourism.

A hierarchical cluster analysis based on the better known tourism type criteria

A hierarchical cluster analysis on this Likert ranked data was undertaken to classify the 45 marine research tourism ventures into seven new marine research tourism classes (Table 4). These seven classes, termed A, B, C, D, E, F and G are organised in increasing order of relative level of volunteer mindedness. Broadly speaking, classes A and B can be considered as vacation minded ventures and classes, C, D, E, F and G can be considered as volunteer minded ventures.

Table 4: Seven new marine research tourism classes

New marine research tourism class	Number of ventures	Relative level of volunteer mindedness (low 1 to high 5)
A (Vacation minded)	6	1
B (Vacation minded)	5	2.4
C (Volunteer minded)	6	3
D (Volunteer minded)	8	4.3
E (Volunteer minded)	7	4.3
F (Volunteer minded)	6	4.7
G (Volunteer minded)	7	4.9
Total	45	

To further understand the tourism conceptual nature of these seven new marine research tourism classes, a discriminant analysis was undertaken on these seven classes and their correlation with better known tourism type criteria. Results (Figure 4) summarise the average value of each better known tourism type criteria for each of the seven new marine research tourism classes. Figure 4 highlights that classes A and B have a low to moderately low (i.e. values less than 3) average level of volunteer mindedness while classes C, D, E, F and G have a moderate to high (i.e. values greater than or equal to 3) level of volunteer mindedness. Figure 4 also highlights that the levels of alternative tourism (i.e. between 2.0 and 4.7), ecotourism depth (i.e. between 2.3 and 5), adventure challenge (i.e. between 2.4 and 4.8), and scientific tourism (i.e. between 2.8 and 5) also exhibit notable variation across the seven new marine research marine research tourism classes. In contrast, levels of educational tourism are relatively constant and moderate to high (i.e. between 3.8 and 5.0) across the seven classes.

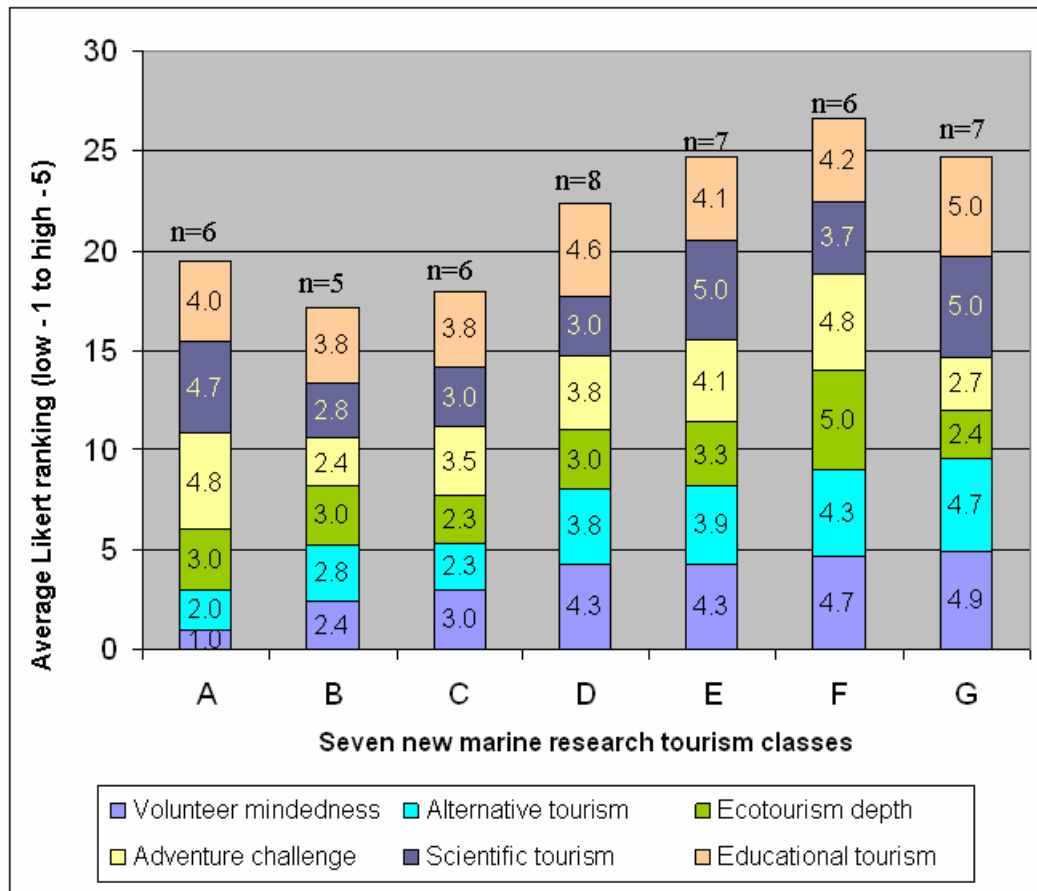


Figure 4: A classification of marine research tourism ventures based on the relative level of better known tourism type criteria

Linking key stakeholder preference criteria with marine research tourism classes

Understanding the preferences of key stakeholders for different classes of marine research tourism venture classes will assist with involving key stakeholders in any development of those marine research tourism classes. Towards this, a discriminant analysis was undertaken on the average distribution of key stakeholder preference criteria across the seven new marine research tourism classes. Results shown in Figure 5 illustrate that all ventures show an average level of marine research quality that is moderate or above (i.e. value greater than 2.8). Figure 5 also highlights that there is also notable variation in the average levels of tourist training (i.e. between 1.0 and 3.7), the tourist's re-require skills (i.e. between 1.3 and 3.6), and tourist hospitality (i.e. between 2.3 and 4.0).

To explore if there are notable levels of better known tourism type criteria, key stakeholder preference criteria for each marine research tourism class, a discriminant analysis was undertaken on the various levels of marine research tourism criteria for each marine research tourism class. Results of the discriminant analysis in Table 5 illustrate the striking difference in nature of each marine research tourism class. Given, key stakeholder views regarding their preference for different characteristics of marine research tourism, this knowledge can be used to assess which marine research tourism classes could be preferred or avoided by key stakeholders. In turn, this knowledge could then be used to determine how to further involve key stakeholder in marine research tourism.

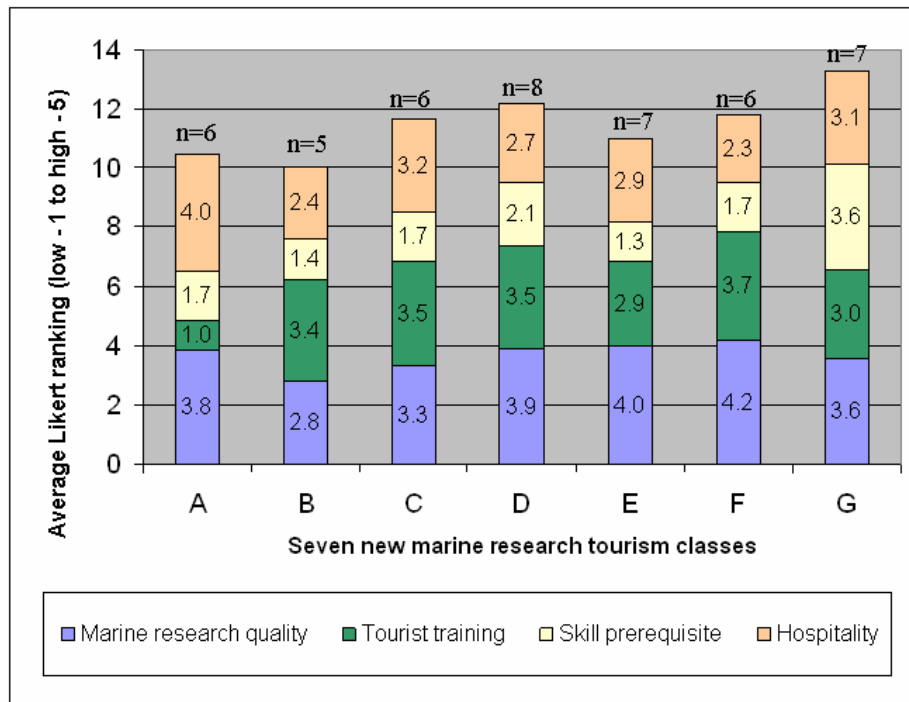


Figure 5: Distribution of key stakeholder preference criteria across the seven new marine research tourism classes

Table 5: Notable features of each new marine research tourism class

New marine research tourism class	Notable levels of marine research tourism criteria
A (Vacation minded)	A high vacation minded venture with moderately high levels of marine research quality, the lowest relative level of tourist training, highest average level of hospitality for tourists, the shared highest level of adventure challenge, and higher levels of scientific tourism.
B (Vacation minded)	A high to moderate vacation minded venture with the lowest level of marine research quality, the lowest level of adventure challenge, higher levels of tourist training, and a shared lowest level of tourist pre-requisite skills, scientific tourism and educational tourism.
C (Volunteer minded)	A vacation and volunteer minded venture with moderate levels of marine research quality, low to moderate level of ecotourism depth, and low to moderate levels of alternative tourism.
D (Volunteer minded)	A moderately high volunteer minded venture with relatively high levels of marine research quality, high levels of alternative tourism, moderate levels of ecotourism depth, moderate to high levels of adventure challenge, relatively low levels of scientific tourism, and higher levels of educational tourism.
E (Volunteer minded)	A moderately high volunteer minded venture with moderate to high levels of marine research quality, lower levels of tourist training, a shared lowest average level of tourist pre-requisite skills, moderately high levels of adventure challenge, and a shared highest level of scientific tourism.
F (Volunteer minded)	A high volunteer minded venture with the highest average level of research quality, highest level of tourist training, moderately low level of hospitality for tourists, high levels of alternative tourism, highest level of ecotourism depth, and shared highest level of adventure challenge.
G (Volunteer minded)	A highly volunteer minded venture with moderately high levels of marine research quality, the highest level of tourist pre-requisite skills, highest levels of alternative tourism, lower levels of ecotourism depth, lower levels of adventure challenge, a shared highest levels of scientific tourism, and the highest level of educational tourism.

To identify notable correlations and possible significant relationships between the various criteria, a correlation analysis was done on the average levels of marine research tourism criteria for each of the marine research tourism classes. Notable results of this correlation analysis are shown in Table 6.

Table 6: Correlation analysis of average levels of marine research tourism criteria across the seven marine research tourism classes

Level of marine research tourism criteria	Pearson (r) correlation relationship. (Between 1, 0 and -1, where 1 is full positive correlation, 0 is no correlation, and -1 is full negative (i.e. negative correlation).
Marine research quality	Positively well correlated with level of adventure challenge ($r = 0.8$) and level of ecotourism depth ($r = 0.6$), and not well correlated with level of tourist training ($r = -0.18$) and skill pre-requisite of tourists ($r = 0.02$).
Volunteer mindedness	Positively well correlated with level of alternative tourism ($r = 0.9$), level of educational tourism ($r = 0.7$), and level of tourist training ($r = 0.7$), and negatively correlated with level of hospitality provision ($r = -0.6$).
Skill training of tourists	Negatively correlated with level of hospitality ($r = -0.9$) and level of scientific tourism ($r = 0.6$), and not well correlated with level of skill pre-requisite ($r = 0.05$).
Skill pre-requisite of tourists	Positively well correlated with level of educational tourism ($r = 0.9$) and level of alternative tourism ($r = 0.6$), and not well correlated with level of marine research quality ($r = 0.02$) and tourist training ($r = 0.05$).
Hospitality provision	Moderately well correlated with level of scientific tourism ($r = 0.5$), negatively correlated with level of tourist training ($r = -0.9$) and level of volunteer mindedness ($r = -0.06$), and not well correlated with level of educational tourism ($r = 0.01$).

Correlation results in Table 6 indicates that, across the seven marine research tourism classes, the average level of marine research quality is not well correlated with the average level of tourists training or skill pre-requisite of tourists (Figure 6). For example, across the seven classes, there is a varying emphasis (e.g. average Likert rank) on the marine research program over tourist training (e.g. A, C and F) and skill pre-requisite (e.g. B, E and F). In terms of possible significant relationships, this can be interpreted as, for each marine research tourism class; there are different relationships between the marine research program and its involvement of skilled tourists and the training of tourists. This in turn, indicates a different focus by the various marine research tourism operators on the intended marine research, volunteer and probably business goals of their marine research tourism ventures.

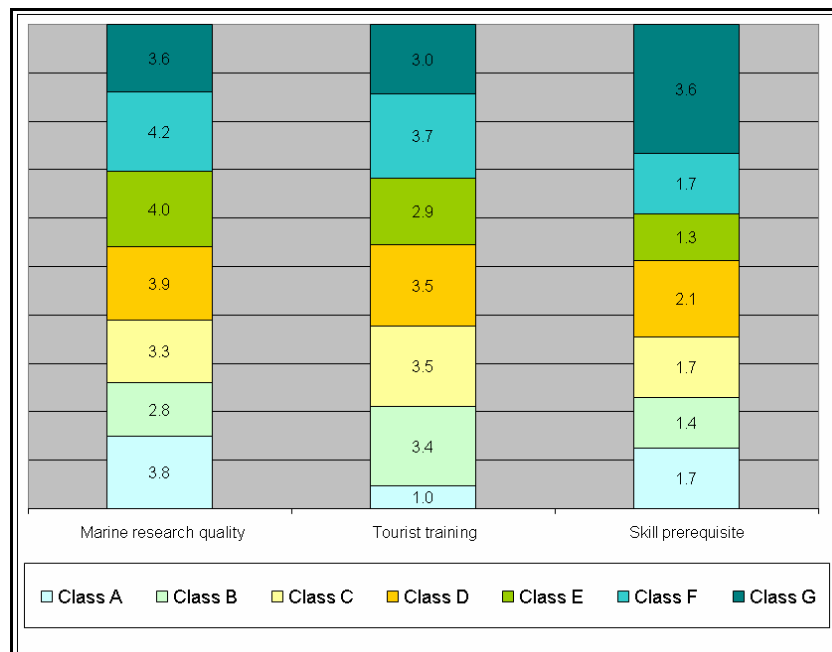


Figure 6: Distribution of average level of marine research quality with level of tourists training and skill pre-requisite of tourists, across the seven identified marine research tourism classes

Another notable correlation result is that the average level of marine research quality is well correlated with the average level of adventure challenge. While this is a perhaps surprising, this result could be interpreted as meaning that high quality marine research often occurs in remote locations, often for several days or more, and with limited supplies, and this can involve higher levels of adventure challenge for the tourist. Another outcome is that the level of skill training is inversely correlated with the level of hospitality and this perhaps reflects the case, in many cases, tourist training can be a costly, and marine research tourism operators, may reduce the levels of hospitality to keep costs down. Finally, the level of hospitality is moderately correlated with the level of scientific tourism. This can be interpreted as many scientists preferring comfortable accommodation, and quality food and service, when travelling on marine research tourism ventures.

While some of these possible interpretations of the nature marine research tourism worldwide may not be considered as surprising, it can be proposed, that the sensibleness of these interpretations indicates a fairly high degree of validity and reliability of the Likert ranked data and multivariate analysis approach. Furthermore, the empirically based derivation of these interpretations provide a basis for confirming that such phenomenon does occur in the real world, and that the marine research tourism concepts that underlie these interpretations also have a fairly high degree of validity and reliability.

DISCUSSION

4. Research Implications for key stakeholder involvement in different marine research tourism venture classes

This research illustrates that marine research tourism can be understood as a combination of better name tourism types. These tourism types being alternative, ecotourism, volunteer, scientific, educational tourism, adventure, and wildlife tourism. However, marine research tourism is not only a form of volunteer tourism and alternative tourism but can also be a form of vacation and less alternative focused tourism. This result matches well with the holiday element of volunteer research tourism as identified in Coghlan (2007). Results also indicate variation in the levels of volunteer mindedness is a key factor to understand marine research tourism. Furthermore, variation in the levels of ecotourism depth and adventure challenge has a similar but lesser and relatively independent role in understanding marine research tourism.

Marine research tourism was classified into seven new marine research tourism classes and these classes were used to analyse the distribution of better known marine research tourism type criteria with key stakeholder preferences for different marine research tourism characteristics. These seven ventures were broadly categorised into two vacation minded ventures and five volunteer minded ventures. They were also broadly categorised into one venture class where the tourist's interaction with marine research is mostly passive yet educationally orientated and six other venture classes where the tourist's interaction with marine research is more active and involves increased skill training. Notably, in terms of the potential involvement of marine researchers or managers, marine research quality was ranked at least moderate for both vacation and volunteer minded ventures.

A major implication of this knowledge for marine researchers or managers marine research tourism can be a relatively complex environment to become involved with. This is further compounded by the fact that most marine research and management agencies are not funded to be associated with marine tourism ventures. In Australia, without the involvement of marine researchers or managers in marine research tourism, it can be considered that the marine

research tourism industry in Australia has little opportunity to notably expand. When considering their involvement in the marine research tourism industry, marine researchers or managers may need to consider any skill training and hospitality provisions inherent in different types of marine research tourism ventures. For example, without external assistance with hospitality, many marine researchers and managers may prefer to be not involved with vacation minded and more passive marine research tourism ventures. However, due to possible tourist training burdens, many marine researchers, managers and marine ecotourism operators may prefer to be involved in vacation minded and more passive marine research tourism ventures. Moreover, due to a preference for higher skilled tourists, many marine researchers and managers may prefer to be involved with volunteer orientated ventures that only attract higher skilled tourists. Such an environment of competing interests may be considered as a moderately complex environment for many marine researchers or managers.

The research suggests that many marine researchers or managers will have a preference for ventures that involve higher skilled tourists. However, it is likely that the tourist market potential for lesser skilled marine research tourists may be larger than the market potential for higher skilled marine research tourists. Therefore, it can be rationalised that while increasing the involvement lesser skilled marine research tourists may notably grow marine research tourism but conversely, this may discourage the involvement of marine researchers or managers in such ventures. It should be noted that while maintaining higher levels of marine research quality, any involvement of lesser skilled tourists may be overcome by reducing the skill training and level of interaction between marine researchers and those less skilled marine research tourists. Analysis of marine research tourism ventures worldwide indicate that this can be compensated by higher levels of hospitality and adventure.

From a tourist's point of view, the preferences of marine research tourists may affect different levels of incentive for marine researcher and managers to be involved in marine research tourism. The literature indicates that many volunteer orientated marine research tourists may seek on-site skill training and active interaction with trained marine researchers. This need for higher levels of skill training and active interaction with marine researchers may act to deter many marine researchers, managers or marine ecotourism operators. On the other hand, more vacation minded tourists may seek lower levels less training and more passive interaction with marine researchers, and this may increase the involvement of many marine researchers, managers in those ventures

Increasing the numbers of marine research tourists can be considered as essential for any expansion of marine research tourism across Australia. While attracting prospective marine research tourists is a field for marketers, this research suggests that prospective marine research tourists can be potentially satisfied by both vacation and volunteer minded ventures. Marine research tourist satisfaction will depend on varying levels of skill training, education, the presence of scientists, hospitality, and adventure challenge on marine research tourism ventures. Regarding the potential involvement of marine conservation or education groups, this research suggests that these key stakeholders may prefer to be involved in either vacation or volunteer minded ventures. This is because either vacation or volunteer minded ventures can offer a combination of high levels of skill training and/or education that can suit their goals of increasing awareness of marine research and conservation within the public.

CONCLUSION

These above research suggest that there is a relatively complex array of multiple factors is at play when considering how to involve key stakeholders in marine research tourism. Furthermore, unless some external intervention occurs specifically regarding the training tourists and hospitality provision, these factors appear not readily align in favour of the marine

researcher or manager in any straight forward way. Such a complex environment is likely to be one of the principle reasons why many marine researcher, managers and ecotourism operators can be reticent to be involved in marine research tourism.

The relative sensibleness of research results and conclusions indicates a fairly high degree of validity and reliability of the data collection and analysis methods used for this research. Furthermore, research results and conclusions provide an empirical basis for confirming that various correlations of marine research tourism factors do occur in the real world and that the underlying marine research tourism and key stakeholder concepts have a fair degree of validity, reliability and usefulness.

This research demonstrates that relating the conceptual nature of marine research tourism with key stakeholder preferences for different marine research tourism factors does provide a useful model and knowledge that could be used to understand how to involve various key stakeholders with the different types of marine research tourism ventures. The importance of this is that such knowledge may be used to expand marine research tourism across Australia and provide new opportunities for more key stakeholders to reap the potential benefits of marine research tourism.

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